CLAIMS

1. A method for scheduling weighted transmissions from two or more transmit antennas of a base station to each of two or more mobile stations in a closed-loop transmit diversity system, the method comprising steps of:

determining the quantity of power available for data transmission from each transmit antenna;

determining each combination of set of mobile stations that may be served simultaneously by a base station;

for each combination set, computing unused power Δ with reference to the quantity of power available for data transmission from each transmit antenna, and the power required to transmit data from each transmit antenna to each respective mobile station in the said set;

for each of said combination sets of mobile stations, computing a global cost from a global cost function with reference to one or more variables, including said unused power Δ;

determining the combination set of mobile stations that has a substantially minimum global cost; and

scheduling the transmission of data from each transmit antenna to the mobile stations which constitute said combination set of mobile stations that has a substantially minimum global cost.

2. The method of Claim 1, wherein the step of computing a global cost function further comprises the steps of:

computing a conventional cost function;

computing an unused power cost function; and

computing said global cost function as a weighted sum of said conventional cost function and said unused power cost function.

3. The method of Claim 1, wherein the step of computing a global cost function further comprises the steps of:

computing a conventional cost function $C_{Pr}(S)$;

computing an unused power cost function $C_{Pw}(\Delta(S))$; and computing said global cost function as a weighted sum of said conventional cost function and said unused power cost function according to:

$$C(S) = \alpha\ C_{Pr}(S) + (1-\alpha)\ C_{Pw}(\Delta(S)),$$

wherein α is a predetermined value.

4. The method of Claim 1, wherein the step of computing a global cost function further comprises the steps of:

computing a conventional cost function $C_{Pr}(S)$ with reference to at least one of terms of a subscription and time in queue waiting to be served;

computing an unused power cost function $C_{Pw}(\Delta(S))$; and

computing said global cost function as a weighted sum of said conventional cost function and said unused power cost function:

$$C(S) = \alpha\ C_{Pr}(S) + (1-\alpha)\ C_{Pw}(\Delta(S)),$$

wherein α is a predetermined value.

5. The method of Claim 1, wherein said step of determining which combination set of mobile stations has a substantially minimum global cost further comprises determining which combination of mobile stations has a minimum global cost which is less than a predetermined quantity ε.

6. The method of Claim 1, wherein the step of computing unused power cost Δ further comprises, for each combination set of mobile stations, the steps of:

calculating, for each transmit antenna, the difference between the power available to the antenna, and the sum of the power required by each mobile station constituting a combination set; and

determining the sum of said differences.

7. The method of Claim 1, further comprising the steps of:

determining whether any of said differences is a negative value; and

upon a determination that any of said differences is a negative value, setting Δ equal to a predetermined value.

8. The method of Claim 1, further comprising the steps of:

determining whether any of said differences is a negative value; and

upon a determination that any of said differences is a negative value, marking as unserviceable the combination set of mobiles that produces said negative value.

9. The method of Claim 1, wherein the power required by each mobile station is quantized.

10. A base station comprising:

two or more transmit antennas, each of which comprises a quantity of power available for the transmission of data;

an electronic data processor adapted for executing program code, said processor being connected to said two or more transmit antennas and being configured for configuring data for transmission via said two or more transmit antennas;

a memory connected to said processor, the memory comprising:

program code for determining each combination of set of mobile stations that may be served simultaneously by a base station;

program code for computing, for each combination of set of mobile stations, unused power Δ with reference to the quantity of power available for data transmission from each transmit antenna, and the power required to transmit data from each transmit antenna to each respective mobile station in the said set;

program code for computing, for each of said combination sets of mobile stations, a global cost from a global cost function with reference to one or more variables, including said unused power Δ;

program code for determining the combination set of mobile stations that has a substantially minimum global cost; and

program code for scheduling the transmission of data from each transmit antenna to the mobile stations which constitute said combination set of mobile stations that has a substantially minimum global cost.

11. The base station of Claim 10, wherein the program code for computing a global cost function further comprises:

program code for computing a conventional cost function;

program code for computing an unused power cost function; and

program code for computing said global cost function as a weighted sum of said conventional cost function and said unused power cost function.

12. The base station of Claim 10, wherein the step of computing a global cost function further comprises:

program code for computing a conventional cost function $C_{Pr}(S)$;

program code for computing an unused power cost function $C_{Pw}(\Delta(S))$; and computing said global cost function as a weighted sum of said conventional cost function and said unused power cost function according to:

$$C(S) = \alpha\ C_{Pr}(S) + (1-\alpha)\ C_{Pw}(\Delta(S)),$$

wherein α is a predetermined value.

13. The base station of Claim 10, wherein the program code for determining which combination of set of mobile stations has a substantially minimum global cost further comprises program code for determining which combination set of mobile stations has a minimum global cost which is less than a predetermined quantity ε.

14. The base station of Claim 10, wherein the step of computing unused power cost Δ further comprises, for each combination set of mobile stations:

program code for calculating, for each transmit antenna, the difference between the power available to the antenna, and the sum of the power required by each mobile station constituting a combination set; and

program code for determining the sum of said differences.

15. The base station of Claim 10, further comprising:

program code for determining whether any of said differences is a negative value; and

program code for upon a determination that any of said differences is a negative value, setting Δ equal to a predetermined value.

16. The base station of Claim 10, further comprising:

program code for determining whether any of said differences is a negative value; and

program code for upon a determination that any of said differences is a negative value, marking as unserviceable the combination set of mobiles that produces said negative value.

17. A closed-loop transmit diversity system comprising:

two or more transmit antennas, each of which comprises a quantity of power available for the transmission of data;

two or more mobile stations, each of said mobile stations being adapted for transmitting indications of the strength of each channel of radio communication established with each of said two or more transmit antennas;

at least one receive antenna configured for receiving from each of said two or more mobile stations said indications of the strength of each channel of radio communication established with each of said two or more transmit antennas;

an electronic data processor adapted for executing program code, said processor being connected to said two or more transmit antennas and to said at least one receive antenna, said processor being configured for receiving said indications from said receive antenna and for configuring data for transmission via said two or more transmit antennas;

a memory connected to said processor, the memory comprising:

program code for determining, based on said indications of channel strength, the quantity of power required to transmit data on each of said two or more transmit antennas;

program code for determining each combination of set of mobile stations that may be served simultaneously by a base station;

program code for computing, for each combination of set of mobile stations, unused power Δ with reference to the quantity of power available for data transmission from each transmit antenna, and the power required to transmit data from each transmit antenna to each respective mobile station in the said set;

program code for computing, for each of said combination sets of mobile stations, a global cost

from a global cost function with reference to one or more variables, including said unused power Δ;

program code for determining the combination set of mobile stations that has a substantially minimum global cost; and

program code for scheduling the transmission of data from each transmit antenna to the mobile stations which constitute said combination set of mobile stations that has a substantially minimum global cost.

18. The system of Claim 17, wherein the program code for computing a global cost function further comprises:

program code for computing a conventional cost function;

program code for computing an unused power cost function; and

program code for computing said global cost function as a weighted sum of said conventional cost function and said unused power cost function.

19. The system of Claim 17, wherein the program code for determining which combination of set of mobile stations has a substantially minimum global cost further comprises program code for determining which combination set of mobile stations has a minimum global cost which is less than a predetermined quantity ε.

20. The system of Claim 17, wherein the step of computing unused power cost Δ further comprises, for each combination set of mobile stations:

program code for calculating, for each transmit antenna, the difference between the power available to

the antenna, and the sum of the power required by each mobile station constituting a combination set; and

program code for determining the sum of said differences.